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10/084,057	02/28/2002	Pak Shing Cho	10565-013	8567

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EXAMINER	
SINGH, DALZID E	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/084,057	CHO ET AL.	
	Examiner	Art Unit	
	Dalzid Singh	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *73-83 and 85-94* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *73-83 and 85-94* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12 April 2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of the restriction requirement in the reply filed on 21 January 2005 is acknowledged.

Drawings

2. The drawings are objected to because "modulating an amplitude of the WDM optical signal" as claimed in claim 85, is shown in Fig. 10 as "pulse modulator" referenced by 1729. In order to maintain consistency with the claim and the specification, "pulse modulator" of Fig. 10 should be labeled as "amplitude modulator". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 73 and 79 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al (US Pub. No. 2003/0090768).

Regarding claim 73, Liu et al disclose optical communication system for carrying optical signals, comprising:

at least one optical fiber having embedded therein an optical signal comprising return-to-zero phase shift key (PSK) optical pulses (as shown in Fig. 1, Liu et al show optical fiber (151) for carrying return-to-zero PSK optical signal; see paragraph [0005]).

Regarding claim 79, as shown in Fig. 1, Liu et al show that the optical fiber is a non-zero-dispersion shifted fiber (as shown in Fig. 1, Liu et al show that the fiber comprises dispersion-managed link; in paragraph [0021] Liu et al disclose that the dispersion is not fully compensated, which indicates that the dispersion is not zero)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 74 and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US Pub. No. 2003/0090768) in view of Begano et al (US Pub. No. 2004/0161245).

Regarding claims 74 and 86, as discussed above, Liu et al disclose optical transmission system transmitting RZ optical signal and differ from the claimed invention in that Liu et al do not disclose that the optical signal further comprises a plurality of non-return-to-zero (NRZ) optical pulses. However, in long haul transmission system it is well known to transmit optical signal in RZ or NRZ format. Bergano et al is cited to show such well known concept. In paragraphs [0005], [0046] and [0047] Bergano et al disclose transmission RZ or NRZ. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to transmit optical signal in non-return-to-zero (NRZ) format. One of ordinary skill in the art would have been motivated to do such in order to reduce dispersion of optical signal.

7. Claim 75-78 and 80-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US Pub. No. 2003/0090768) in view of Sarchi et al (US Patent No. 6,577,800).

Regarding claim 75, as discussed above, Liu et al disclose transmission system comprising of optical fiber (151), as shown in Fig. 1, comprising of dispersion managed link. Liu et al differ from the claimed invention in that Liu et al do not specifically disclose the optical fiber has a zero dispersion wavelength of less than about 1500 nanometers. However, it is well known that there are various types of dispersion fiber which provide zero dispersion for a specific range of wavelength. Sarchi et al is cited to show such well known concept. In col. 9, lines 61-67 to col. 10, lines 1-19, Sarchi et al disclose various wavelength operating around 1550 nanometer to provide zero dispersion. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide zero dispersion for such wavelength. One of ordinary skill in the art would have been motivated to do such in order to reduce crosstalk.

Regarding claim 76, as discussed above, Sarachi et al disclose that the optical signal has a wavelength of between about 1500 nanometers and about 1625 nanometers (see col. 9, lines 61-67 to col. 10, lines 1-19).

Regarding claim 77, as discussed above, Liu et al disclose transmission system comprising of optical fiber (151), as shown in Fig. 1, comprising of dispersion managed link. Liu et al differ from the claimed invention in that Liu et al do not specifically disclose the dispersion of the optical fiber is at least about 2 picoseconds per nanometer per kilometer at a wavelength of the optical signal. However, it is well known that there are various types of dispersion fiber which provide dispersion compensation. Sarchi et al is cited to show such well known concept. In col. 12, lines 1-36, Sarchi et al

disclose various dispersion compensation optical fibers. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide such dispersion for optical fiber. One of ordinary skill in the art would have been motivated to do such in order to compensate for accumulated dispersion along the transmission line.

Regarding claim 78, as discussed above, Liu et al disclose transmission system comprising of optical fiber (151), as shown in Fig. 1, comprising of dispersion managed link. Liu et al differ from the claimed invention in that Liu et al do not specifically disclose the dispersion of the optical fiber is less than about 2 picoseconds per nanometer per kilometer at a wavelength of the optical signal. However, it is well known that there are various types of dispersion fiber which provide dispersion compensation. Sarchi et al is cited to show such well known concept. In col. 12, lines 1-36, Sarchi et al disclose various dispersion of optical fiber. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide such dispersion optical fiber. One of ordinary skill in the art would have been motivated to do such in order to compensate for accumulated dispersion along the transmission line.

Regarding claim 80, as discussed above, Liu et al disclose transmission system comprising of optical fiber (151), as shown in Fig. 1, comprising of dispersion managed link. Liu et al differ from the claimed invention in that Liu et al do not specifically disclose the dispersion of the optical fiber is less than about 15 picoseconds per nanometer per kilometer at a wavelength of the optical signal. However, it is well known that there are various types of dispersion fiber which provide dispersion compensation. Sarchi et al is cited to show such well known concept. In col. 12, lines 1-36, Sarchi et al

disclose various dispersion optical fibers. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide such dispersion optical fiber. One of ordinary skill in the art would have been motivated to do such in order to compensate for accumulated dispersion along the transmission line.

Regarding claim 81, as discussed above, Liu et al disclose transmission system comprising of optical fiber (151), as shown in Fig. 1, comprising of dispersion managed link. Liu et al differ from the claimed invention in that Liu et al do not specifically disclose the dispersion of the optical fiber is less than about -15 picoseconds per nanometer per kilometer at a wavelength of the optical signal. However, it is well known that there are various types of dispersion fiber which provide dispersion compensation. Sarchi et al is cited to show such well known concept. In col. 12, lines 1-36, Sarchi et al disclose various dispersion of optical fiber. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide such dispersion optical fiber. One of ordinary skill in the art would have been motivated to do such in order to compensate for accumulated dispersion along the transmission line.

Regarding claim 82, as discussed above, Liu et al disclose transmission system comprising of optical fiber (151), as shown in Fig. 1, comprising of dispersion managed link. Liu et al differ from the claimed invention in that Liu et al do not specifically disclose the optical fiber has a zero dispersion wavelength of less than about 1310 nanometers. However, it is well known that there are various types of dispersion fiber which provide zero dispersion for a specific range of wavelength. Sarchi et al is cited to show such well known concept. In col. 9, lines 61-67 to col. 10, lines 1-19, Sarchi et al

disclose various wavelengths operating around 1550 nanometer to provide zero dispersion. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide zero dispersion of such wavelength. One of ordinary skill in the art would have been motivated to do such in order to reduce crosstalk.

8. Claims 83 and 91-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US Pub. No. 2003/0090768) in view of Taga et al (US Patent No. 5,872,647).

Regarding claims 83 and 91, Liu et al disclose transmission of RZ-PSK optical signal comprising of phase modulator to modulate optical pulses and differ form the claimed invention in that Liu et al do not specifically disclose an extinction ratio between adjacent pulses of the optical signal that have a relative phase difference of essentially zero is at least about 3 dB and less than about 8 dB. However, it is well known that phase modulated optical have relative phase difference between adjacent pulses. Such difference can be measured by extinction ratio. Taga et al is cited to show such well known concept. In col. 4, lines 28-45, Taga et al teach extinction ratio between optical pulses to be between 3 dB and 10dB. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide such extinction ratio. One of ordinary skill in the art would have been motivated to do such in order to reduce interchannel crosstalk.

Regarding claim 92, the combination of Liu et al and Taga et al further disclose that extinction ratio between adjacent pulses is 10 dB (see col. 4, lines 28-45 of Taga et al) and differ form the claimed invention in that the combination of Liu et al and Taga et al do not specifically disclose relative phase difference of at least about π/2. However, as discussed above, since the optical signal are phase modulated, therefore it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide phase difference between the optical pulses, such as π/2. One of rodinary skill in the art would have been motivated to do this in order to reduce noise or crosstalk.

Regarding claim 93, Liu et al disclose transmission of RZ-PSK optical signal comprising of phase modulator to modulate optical pulses and differ form the claimed invention in that Liu et al do not specifically disclose an extinction ratio between adjacent pulses of the optical signal that have a relative phase difference of essentially zero is at least about 5 dB and less than about 8 dB. However, it is well known that phase modulated optical have relative phase difference between adjacent pulses. Such difference can be measured by extinction ratio. Taga et al is cited to show such well known concept. In col. 4, lines 28-45, Taga et al teach extinction ratio between optical pulses to be between 3 dB and 10dB. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide such extinction ratio. One of ordinary skill in the art would have been motivated to do such in order to reduce interchannel crosstalk.

Regarding claim 94, the combination of Liu et al and Taga et al discloses transmission of RZ-PSK optical signal comprising of phase modulator to modulate optical pulses which has extinction and differ form the claimed invention in that Liu et al do not specifically disclose an extinction ratio between adjacent pulses of the optical signal that have relative phase difference of at least about $\pi/2$ is at least about 20 dB. However, as discussed above, since the optical signal are phase modulated, therefore it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide phase difference between the optical pulses, such as $\pi/2$, and have extinction ratio of at least about 20 dB. One of ordinary skill in the art would have been motivated to do such in order to reduce interchannel crosstalk.

9. Claim 85 and 87-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US Pub. No. 2003/0090768) in view of Bergano et al (US Pub. No. 2004/0161245).

Regarding claim 85, Liu et al disclose a method for optically transmitting data, comprising:

preparing a plurality of phase shift keyed (PSK) optical data streams, each PSK optical data stream having a different wavelength and encoding data from at least one respective data source (see Fig. 1 and paragraph [0005]);

combining the PSK optical data streams to prepare a wavelength division multiplexed (WDM) optical signal (see paragraph [0007]); and,

transmitting the PSK optical signal along an optical fiber of an optical fiber network (as shown in Fig. 1, the PSK signals are wavelength division multiplexed and transmitted to the fiber (151)).

Liu et al differ from the claimed invention in that Liu et al do not specifically disclose modulating amplitude of the WDM optical signal. However, modulating amplitude of optical signal is well known. Bergano et al is cited to show such well known concept. As shown in Fig. 1, Bergano et al show amplitude modulation of optical signal. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide amplitude modulation, as taught by Bergano et al, to the transmission system of Liu et al. For example, such amplitude modulator could be placed after WDM (161). One of ordinary skill in the art would have been motivated to do such in order to vary optical signal intensity relative to the optical pulse signal.

Regarding claim 87, as discussed above, Liu et al disclose each PSK optical data stream is a binary phase shift keyed BPSK optical data stream encoding data from a single respective data source (the data stream is in binary form such as 0's and 1's; see paragraph [0019]).

Regarding claim 88, Liu et al disclose that each PSK optical data stream is a quaternary phase shift keyed optical data stream encoding data from a respective pair of data sources (see paragraph [0039]; Liu et al disclose that the data could also be combined with QPSK).

Regarding claim 89, as discussed above, modulating amplitude is performed after combining the PSK optical data streams (as discussed above, the amplitude modulator, as taught by Bergano et al, could be placed after WDM (161) of Liu et al).

Regarding claim 90, as shown in Fig. 1, Liu et al show plurality of PSK optical data streams comprises modulating a phase of light provided by a cw light source.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Matsuo et al (US Patent No. 6,546,177) is cited to show dispersion shifted optical fiber.

Bickham et al (US Patent No. 6,694,081) is cited to show dispersion managed cable for WDM systems.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272--3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DS
June 9, 2005
David Singh